Methods for Training Cognitive Skills in Battlefield Situation Assessment

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14. ABSTRACT *(Maximum 200 words)*:

Situation assessment provides the basis for decisions by battlefield commanders and their staff during both planning and operations. In previous work, we developed a framework for battlefield commanders' situation assessment from interviews with active-duty command staff and from published work in cognitive psychology. The present report describes methods for training cognitive skills in situation assessment based on that framework.

Two training methods have been developed, both of which focus on metacognitive skills involved in verifying and improving assessments and plans. The first method helps officers find and assess the reliability of hidden assumptions. It includes a devils' advocate technique that forces officers to imagine that their assessment is wrong and to explain why, as well as techniques for handling potential problems that are found. The second method helps officers find and resolve conflicting evidence. It includes techniques for trying to explain the conflicting data in terms of the current assessment, evaluating the plausibility of the explanations, and generating alternative assessments. The training techniques have been experimentally tested with active-duty officers, and the results of that testing are described in a companion report.

The training methods appear to have wide potential applicability in military as well as nonmilitary contexts.

15. SUBJECT TERMS

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FOREWORD

The U.S. Army strives to have competent officers trained in the art of battle command. One discipline of that art is the assessment of battlefield situations. An experimental program of research was conducted to determine ways to improve the cognitive skills used in situation assessment. The training concepts presented in this report were a key component of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Fort Leavenworth Research Unit's research program. This research was initiated in 1994 at the special request of the Commander of the U.S. Army Training and Doctrine Command.

This report describes the rationale and intent of instruction to safeguard against uncertain or unreliable information and how to handle information conflicts. A companion report, ARI Technical Report 1050, provides experimental evidence collected on Army leaders that shows the merits of the instruction.

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METHODS FOR TRAINING COGNITIVE SKILLS IN BATTLEFIELD SITUATION ASSESSMENT

EXECUTIVE SUMMARY

Research Requirements:

Situation assessment provides the basis for decisions by battlefield commanders and their staff during both planning and operations. There is a need for training that enhances the component skills in situation assessment. Such training should be based on a model of the knowledge representations and cognitive processes that are utilized in situation assessment.

Procedure:

A framework for battlefield commanders' situation assessment has been developed, based on interviews with active-duty command staff and on published work in cognitive psychology. Principles for improving situation assessment skills were developed based on the framework. The situation assessment framework and principles for improving situation assessment skills were developed based on the framework and the improvement principles; these training techniques are described in the present report. The training techniques have been experimentally tested with active-duty officers, and the results of that testing are described in a companion report.

Findings:

Two training methods have been developed. Both methods focus on metacognitive skills involved in critiquing and correcting assessments and plans. The skills concern finding hidden assumptions in existing assessments and plans, and handling data that conflict with assessments.

The first method is tinted to help officers find and assess the reliability of hidden assumptions before those assumptions cause problems. In essence, the method helps counteract overconfidence. It includes a devil's advocate technique that forces officers to imagine that their exploration of how potential problems with an assessment can be handled, e.g., by collecting additional data to verify assumptions, planning against the possibility that assumptions will fail, or accepting an assumption as a known risk.

The second method is designed to help officers find and resolve conflicting evidence. This second method deals with assumptions after they cause problems, through inadequate assessments or plans. This method improves the chances of noticing conflicting data by sensitizing officers to it and providing tools for handling it when it occurs. These tools include techniques for trying to explain the conflicting data in terms of the current assessment, evaluating the plausibility of the explanations, and generating alternative assessments. The training discusses methods for evaluating competing assessments in terms of the plausibility of the assumptions they require.

Utilization of Findings:

The training methods appear to have wide potential applicability. The kinds of skills they address seem appropriate in very diverse domains where initial judgments and responses can be verified and improved if time, stakes, and novelty warrant. They may apply in fields ranging from combat to fire fighting to medical decision making. Certainly, they appear to apply across a wide spectrum of Army battlefield environments and force configurations.

Training in effective thinking skills, as illustrated in this report, can be introduced quite early in an officer's training and can be continued and expanded as training progresses. At the basic level, the training could be applied to simpler tactical situations and decisions, while joint tactics as well as operational and strategic decisions would be addressed in more advanced training and exercises. Across all these stages of training, and across a variety of Army battlefield specializations, the thinking processes that are taught would share a consistent set of concepts and procedures. That same framework could serve as an aid in the design and evaluation of exercises and wargames. The groundwork for shared situation understanding and effective coordination would thus be laid as early as possible and would evolve into an explicitly common framework as training progressed.

METHODS FOR TRAINING COGNITIVE SKILLS IN BATTLEFIELD SITUATION ASSESSMENT

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METHODS FOR TRAINING COGNITIVE SKILLS IN BATTLEFIELD SITUATION ASSESSMENT

INTRODUCTION

This report describes a training method for enhancing two metacognitive skills that are critical to officers performing battlefield situation assessment. The skills concern finding hidden assumptions in existing assessments and plans, and handling data that conflict with expectations.

The training methods convey techniques that have several attributes to recommend them. First, the techniques are simple. They can be executed entirely in the head, if necessary, and officers report that the techniques are comprehensible and memorable. Second, these are rapid techniques. They can be performed in minutes, not hours. Third, they can be executed by an individual or a group (an aspect of the methods that we will discuss in a future report). Third they can be used to refine plans as well as assessments. Fourth, they produce a narrative account of reasoning that may benefit individual or group decision making. Whereas recognitional decision making processes are automatic (and thus unavailable for reflection or reporting) and analytical processes are too abstract to communicate easily in groups. the decision making processes trained here are both explicit and concrete. Officers who use the reasoning processes trained here should be able to explain their decisions and participate in critiques of their decision making.

The training techniques are based on a cognitive framework for battlefield situation assessment, which was itself based on the results of extensive interviews with active-duty officers as well as findings and research in cognitive psychology. This report begins with a review of the battlefield situation assessment framework upon which the training is based (Cohen, Adelman, Tolcott, Bresnick, & Marvin. 1993). The second section. concerning training. opens with a description of training principles that derive from the situation assessment framework, and continues to describe the training methods themselves. For each training method, we present a description of the technique meant to convey the target skill. an illustration of the technique. and a summary have been pilot tested and evaluated in experimental sessions with officers from three different operational divisions. A subsequent report will describe the results of these tests.

THE BATTLEFIELD SITUATION ASSESSMENT FRAMEWORK

Overview

The framework that we have used to analyze battlefield situation assessment framework consists, at the most general level, of four components (see figure 1):

1. The real-world environment.

2. Memory and knowledge structures;

3. Actions, goals, and values; and

4. Processes for regulating and monitoring cognition

The figure represents these components as arcs that comprise a circle. The diagram partitions these components with concentric circles, which represent different aspects of memory, from the immediate focus of working memory in the innermost ring, to the contents of long-term semantic and episodic memory in the outer ring (as discussed in the following section).
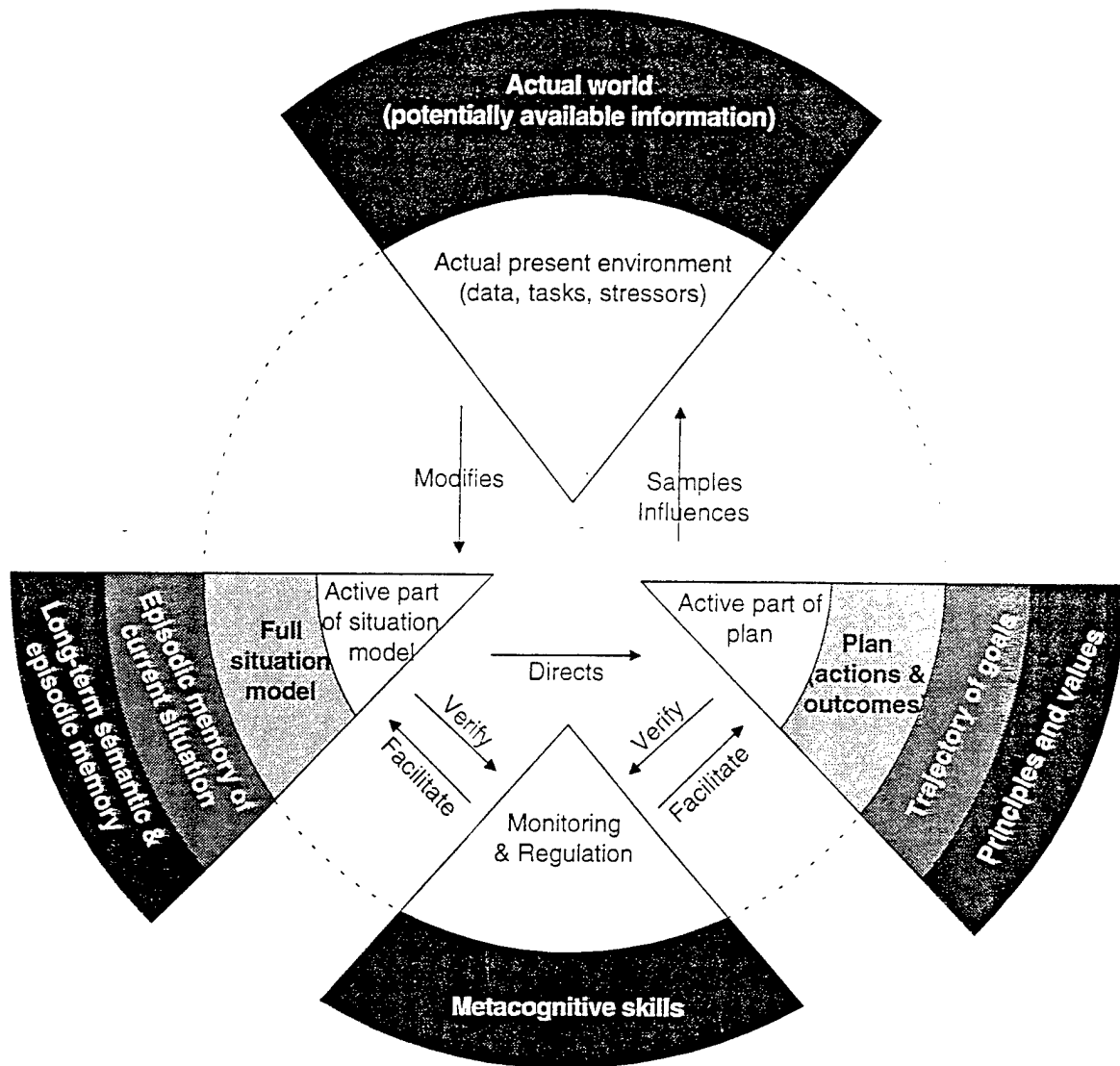
Figure 1: Framework for the adaptive decision-making model.

The basic form of the framework is inspired by Neisser (1976). In his concept of the perceptual cycle, knowledge structures called schemas actively direct actions such as attending to and exploring the environment. The real-world information generated by that exploration then causes changes in the schemas. These interactions cycle continuously as the observer gains understanding of the actual world. Connolly and Wagner (1988) extended Neisser's concept to include decision cycles, in which exploration of the environment causes decision makers to refine their goals. We have incorporated this extension, and have added the iterative role of metacognition, i.e., monitoring and regulating one's own cognitive processes, in learning both about the world and about one's own goals.

Neisser's perceptual cycle consisted only of a path from knowledge to action to real-world and back to knowledge. Our notion of cognitive cycle, however, includes many other pos-sibilities. The metacognitive component may critique and correct situation knowledge and plan knowledge; plan knowledge directs sampling of the environment; these perceptual samples modify situation knowledge, which can direct the composition of plan knowledge. As just one

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example of the potential cycles of assessment, an initial knowledge structure may be checked by metacognitive processes, modified, and checked again, before leading to an action plan, which is also checked by metacognition before being implemented in the environment, resulting in new knowledge. When time is limited, metacognitive critiquing and correcting may be omitted.

To understand the potential of the model, it is important to examine each of its three cognitive components (excluding the environment) more closely.

Situation Knowledge: Enemy Intent Schemas & Action Strategies

We partition knowledge structure in this model, as do Adams, Tenney, and Pew (1991), into four segments:

1. The explicit focus of working memory (representing the currently attended part of the situation),

2. The implicit focus of memory (containing the full situation model),

3. Current episodic memory (containing the history of the current problem), and

4. Long-term memory (with both semantic and episodic contents).

Long-term knowledge takes the form of memory schemas. These are used to organize situation assessment information. More proficient situation assessors appear to use a variety of schemas. Among the most important are the *enemy intent schema* and associated *action strategies*.

Commanders use enemy intent structures to organize information about enemy interests, strengths, and location, and describe how they lead to intentions, actions, and consequences. Take, for example, a situation in which a U.S. officer must infer the intent and actions of an enemy who may attack along northern or southern fronts. The officer knows that tanks are a prime source of enemy strength, and that U.S. forces have situated tank killing systems in a southern region. Enemy interests (a term we broadly define to include values, doctrine, and goals) include doctrine to avoid opposing strength, such as northern U.S. tank killing systems. Finally, enemy location allows attack in the north or south because terrain is hospitable in both areas. These factors enable the U.S. officer to infer that the enemy intent is to attack to the north, that this will involve such actions as moving artillery, massing troops, and command facilities to the north. The enemy's intended consequence will be a northern breakthrough.

Action strategies build on the enemy intent structure. They include three modes of thinking about enemy intent: proactive, predictive, reactive.

In the proactive mode, the officer's conception of the situation is predicated on molding enemy intent by shaping the battlefield, and specifically by altering the enemy's perception of his own interests, strength or location. For example, an officer's assessment of a situation may assume that his planned deceptions will influence enemy estimations of relative strength, and that the deceptions will persuade the enemy to adopt an intent to attack a force that is, in fact, superior to his own.

The predictive orientation is one in which the commander uses his knowledge of enemy interests, strength and location to predict enemy intent. For example, the officer who understands the enemy interest, strength and location described above might predict the northern attack.

In the reactive mode, a commander infers enemy intent from the actions the enemy carries out, or by observing their consequences. The commander hit from the north by enemy tanks

would, clearly, infer the enemy's intent, and possibly reconstruct the causal chain to that intent from enemy interests, strength and location.

These strategies are not mutually exclusive. A predictive strategy may employ reactive methods (i.e., observations of enemy actions) to confirm the predictions. A proactive strategy may use predictive methods to decide what actions would produce the desired enemy intent, and may use reactive methods to confirm that the attempt to influence enemy intent was successful.

There are a range of other schemas that officers bring to bear on situation assessment. We will not discuss them here, but the following list conveys their character:

- Enemy goal structures describe the hierarchical and compensatory relationships among values, goals, and actions.

- Temporal plan execution structures provide a more detailed description of the temporal durations, precedence relations, and causal contingencies among actions and events.

- Enemy planning structures describe the enemy roles and activities involved in producing, communicating, and implementing plans.

- Terrain structures relate terrain features to expected enemy actions and prescribed friendly actions.

Value/action structures

Actions, goals, and values reflect a qualitatively different way of viewing knowledge. They represent how possible states of affairs are valued, whereas situation knowledge represents how strongly they are believed. Values or preferences are importantly different from strengths of belief. They influence beliefs, but are separate from them. We draw on Beach's (1990) concepts of the value image, trajectory image, and strategic image to define these segments.

High-level values are relatively permanent knowledge about what the decision maker regards as desirable, important, and worth pursuing.

Current goals reflect the desired sequence of states from the present into the future: they are concrete realizations of high-level values in the current situation. Goals thus involve episodic memory. Goals are used to generate plans and provide the larger meaning for specific actions.

The current plan is the detailed set of actions and action contingencies that the decision maker has adopted in the current situation. It includes the specific actions (e.g., "move up follow-up forces," "emplace artillery," look for a kill zone, etc.) undertaken to realize goals.

The part of the plan active in working memory is the immediate focus of evaluation. Such evaluation may occur prior to implementation as part of the decision making process, or during implementation by monitoring an on-going action for its success in achieving goals.

Processing of actions, goals and values can be either top down or bottom up (Beach, 1990). Actions and plans may be generated and evaluated based on goals, and modified or rejected if they fail to achieve them. Similarly, goals may be generated and evaluated based on values. On the other hand, from a bottom-up perspective, goals may be revised if no actions can be found to achieve them. Even high-level values (such as maintaining the initiative, or attacking the enemy's center of gravity) might be revised (perhaps rationalized away) if they are not achievable by realistic goals or actions.

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Metacognitive knowledge: Overview

Metacognition consists of functions that monitor and regulate thought. It has been defined as "individuals' knowledge of the states and processes of their own mind and/or their ability to control or modify these states and processes" (Gavelek and Raphael, 1985).

Metacognition is the focus of considerable attention by developmental psychologists (e.g., Flavell, 1979; Forrest-Pressley, MacKinnon, and Waller, 1985), interested in how children learn to manage the cognitive activities involved in reading, comprehending, memorizing, and paying attention. Evidence for similar processes is found in the literature on expert-novice differences in problem solving.

While experts may be said to "recognize" familiar problems, recognition is sometimes achieved through the evaluation of intermediate results. For example, according to Larkin, McDermott, Simon, & Simon (1980), physics experts often construct and examine a sketch of the superficial objects and relations in a physics problem in order to determine the next step: If the depicted system is familiar, the expert may proceed directly to the equations required for solution. If the system is unfamiliar, the expert constructs an idealized representation (i.e., a free-body diagram), which is then used in the generation of solution equations. According to Chi, Glaser, and Rees (1982), this qualitative analysis of a problem is not a discrete phase that is concluded prior to the generation of quantitative equations. They found that experts returned to, and refined, the initial gross representation when necessary throughout the course of the problem. In short, experts manipulate the situation until they understand it. That is, they change their representation of the problem until it makes contact with their knowledge. Metacognitive skill is required in judgments of familiarity and of how best to transform the problem to make it familiar.

Metacognition also plays a role after the problem has been recognized and (apparently) "solved." Physics experts utilize the abstract physical representation of a problem to verify the correctness of their method and result, e.g., by checking whether all forces are balanced, whether all entities in the diagram are related to givens in the problem, etc. Similarly, in chess, Simon (1972) observed that some masters search the space of future moves and countermoves to verify that the moves they recognized as best are in fact in the subset of good moves. More recent research has found that differences in search skill (i.e., depth, breadth, and speed) are correlated with chess expertise (Charness, 1981; Holding and Reynolds, 1982). Key aspects of searching to verify recognized answers are metacognitive: the processes of initiating search, monitoring and evaluating its results, and deciding when it should be terminated.

In sum, metacognitive processes are crucial in two phases of intuitive decision making:

- Constructing a situation model or plan when recognition is uncertain.

- Verifying the results of recognition

We have devised a model that incorporates both recognition and facilitative processes, and we call it the Recognition/Metacognition model (Cohen, 1993a; Cohen, 1993b). It has three key components (see figure 2): Quick Test, Critiquing, and Correcting. Each represents a different category of skill in situation understanding and decision making. We will address each in turn.

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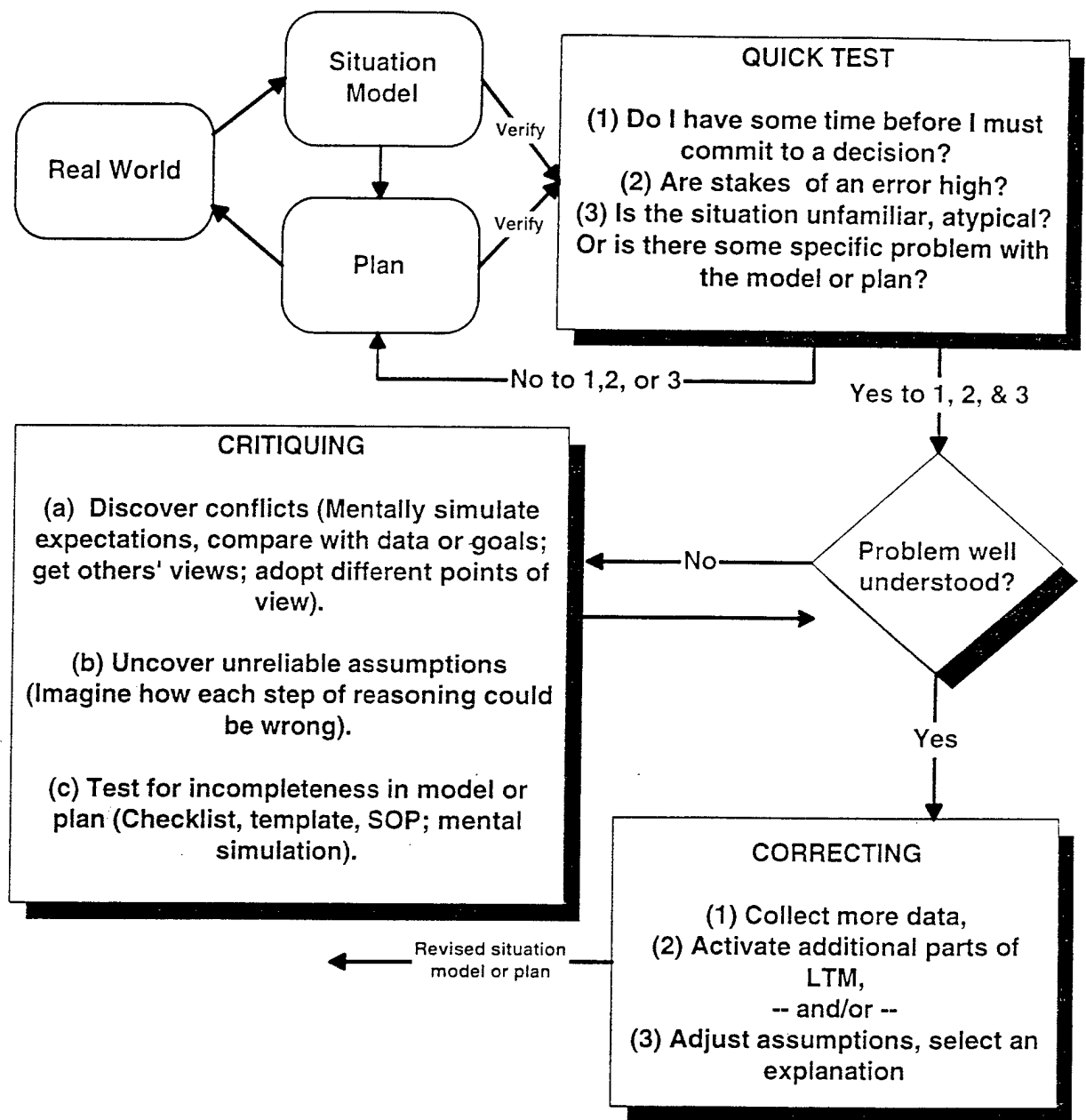
Figure 2: Metacognitive knowledge and process flow

Metacognitive knowledge: The Quick Test

The Quick Test is a gate-keeping function that determines whether (1) to engage critiquing and correcting processes that might improve problem recognition or (2) whether the current level of understanding can (or must) suffice.

This process answers the question: Is there some reason to think more about my current model or plan, or should I act immediately? The answer is based on three more specific questions: (1) Do I have time before it is necessary to commit to a decision? (2) Are the stakes of an error high? and (3) Is there significant reason to doubt my initial situation assessment or plan? Quick Test skills thus involve sensitivity to the availability of time and potential costs of delay; sensitivity to the costs of errors that might occur if one acts now on the best solution to date; and

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sensitivity to the typicality of a situation and, conversely, to the presence of unusual or troubling features. If all three of the Quick Test conditions are satisfied, Quick Test inhibits the recognition-based response and triggers a process of knowledge-based reasoning. If at least one of the Quick Test conditions is not satisfied, the initial model or plan is accepted, and no critiquing or correcting takes place.

The R / M model integrates concepts from other models. According to Klein (1993), rapid recognition-primed decision making is expected under conditions of high time pressure. According to Connolly and Wagner (1988), rapid processing may occur when there is low cost of an error. According to both Klein (1993) and Rasmussen (1993), it is expected in highly familiar situations, that is from decision makers with situation-specific expertise. If any one of these conditions is true, then the answer to the corresponding Quick Test question is "no," and correcting and critiquing do not take place.

The Quick Test can be a relatively explicit and conscious process, or a form of recognitional processing at a higher level that can be extremely rapid and virtually automatic.

Metacognitive knowledge: Critiquing

An initial situation model or plan may fail the Quick Test because specific problems are apparent or simply because the situation is complex or unfamiliar. In the latter case, the next goal in metacognitive processing is to answer the question: Are there specific potential problems with the current model or plan? Critiquing is the stage of ferreting out such problems.

Critiquing can result in the discovery of three kinds of problems in the current model or plan: incompleteness, unreliability, or conflict. Situation understanding or planning is incomplete if conclusions and options are not specific and detailed enough. Understanding and planning may be complete but unreliable if the link between data and evidence, or the link between actions and goals, is uncertain or conditional. Finally, even if understanding and planning are complete and free of obvious unreliable assumptions, there may be an alternative, conflicting conclusion that better accounts for some of the data, or an alternative incompatible action that better achieves some of the goals.

Some critiquing methods are general-purpose. They are capable of uncovering problems of all three kinds. Mental simulation and retrieval of similar cases from experience are general-purpose in this sense. For example, by mentally simulating a course of action, an officer might be able to see if the current plan has any gaps, if it reliably achieves goals, and whether it conflicts with other goals. Similarly, comparison of a plan with an analogous previous experience might reveal gaps in the present plan, suggest places where the plan might not work reliably, or suggest alternative actions that have been adopted in the past.

Other critiquing methods are more specialized in the kinds of problems they can uncover. For example, decision makers might use a checklist or standard operating procedure to ensure that all required components of a model or plan have been specified (completeness). They might adopt a devil's advocate technique in order to ferret out unreliable assumptions in an assessment or prediction. Data collection can determine if observations are consistent or conflicting with the current situation model or plan.

Metacognitive knowledge: Correcting

If no specific problem with the model or plan is identified by either the quick test or critiquing, then metacognitive processing in the current cycle is complete. But if a specific

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problem is found, the third major function of metacognition is enlisted: facilitating the construction of an improved model or plan. Whatever problem is discovered, three methods are available to solve it:

1. Collecting more data to fill gaps in the model or plan, confirm or disconfirm an assumption, or to resolve conflict

2. Activating existing knowledge in long-term memory, for the same purposes

3. Adding assumptions to fill gaps or resolve conflict, and dropping or replacing assumptions when they appear unreliable or conflict with other information or assumptions

Metacognitive processes play a role in choosing among these processes, and in regulating the process that is chosen: (1) in selecting the amount and type of data collection, (2) in directing the search for knowledge in long-term memory, and (3) in adjudicating among competing possible assumptions.

Data collection. Sometimes there is time and opportunity to collect additional data to flesh out or resolve ambiguity in a model or plan, or confirm or disconfirm doubtful assumptions. The decision to collect more data rather than simply think about the problem involves metacognitive judgments regarding the amount of available time, the cost and potential risks of data collection, and the trustworthiness of information sources.

Knowledge activation. Metacognitive processes are crucial in guiding the serial activation of knowledge in long-term memory. Such searches are conceived of as controlled spreading activation. Executive processes determine which components of the current model will be attended, thus influencing the portions of long-term memory likely to be activated next (McClelland & Rumelhart, 1986). The values of the attended nodes are fixed, or clamped, at a high level of activation (in effect, accepting them provisionally or by assumption) in order to explore their implications. In the next cycle, new nodes may be clamped, and so on, until knowledge is activated that satisfies the goals of the search (or quick verification determines that time has run out). Different officers will attend to aspects of the situation in different orders. Some may focus attention on knowledge of terrain, others on knowledge of enemy strength. others on knowledge about enemy goals, and others on knowledge of enemy actions.

Metacognitive control may influence search in another way, by adjusting the degree of similarity required for a match between patterns in active memory and stored structures (cf.. Hinton & Sejnowski, 1986). When the threshold is set low, the activation net is cast wide, and far-fetched ideas have a significant chance of being considered. When the threshold is set high. an idea must have a very high degree of association with currently active beliefs to have a chance of being activated. Low thresholds may be used. for example, when schema is readily available that fits all the data, or no plan is readily available that can achieve important goals.

Adjusting assumptions. If data collection is infeasible because of limitations in resources, time, or sources of information, and if definitive knowledge is not available or cannot be accessed from long-term memory, the situation assessor may adopt assumptions to remedy incompleteness in his model of the situation. Metacognitive processes are crucial in the interpretative process of evaluating and revising assumptions. Decision makers think and act as if assumptions were true until there is some reason to doubt them. Conflict between data and a situation model, or between two competing models, provides such a reason for doubt. Conflict indicates that at least one of the beliefs involved in building the models or interpreting the data

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was false. Conflict may thus trigger a metacognitive process of exposing hidden assumptions and questioning their reliability. The process of revising beliefs to explain conflict requires a variety of metacognitive skills: awareness that conflict exists, an ability to uncover implicit assumptions that have created the conflict, sufficient awareness of the structure of one's beliefs to identify the assumptions that are central to a variety of models and plans, and sensitivity to factors that indicate unreliability of assumptions, for example, by recalling past episodes in which the same beliefs led to a conflict. Finally, the process of assumption revision calls for balancing the plausibility and the power of the resulting models and plans.

TRAINING METACOGNITIVE SKILLS

Training Principles

We derive from the R/M model several principles for training (to be described at greater length in another report). These principles contrast with those that reflect different models of decision making. For example, if we view decision making as an analytical process, a perfectly appropriate stance in some circumstances, then it follows that instruction should focus on the transformations required to represent problems within the analytical model (for example, quantitative representations of probabilities and utilities). Practice may be partitioned such that trainees study parts of the method before attempting to execute the whole. Examples should come from varied domains to demonstrate the generality of the method, and they should be presented in a graduated sequence progressing from problems that clearly afford the analytical technique (that is, they require little in the way of transformation) to those that superficially seem inappropriate to the technique (that is, they are quite difficult to completely and accurately represent).

If decision making is taken to be a recognitional process, again a reasonable assumption in some situations, then the following inferences about training hold. Instruction should focus on goals, environmental conditions, and actions. In procedural terms, instruction should convey the following type of knowledge: if your goal is X amidst events Y, then perform action Z. Practice conditions should be realistic to promote accurate recognition and repetitive to facilitate automatic performance. Examples should be representative of the domain, though feedback may be made more explicit and immediate to speed training.

Training that assumes an adaptive model of decision making, such as the R/M model, should first of all convey the iterative nature of problem solving — from recognition to metacognitive checks, critiques, and corrections, back to recognition. It must also aim to sensitize trainees to domain-specific cues concerning the time constraints, stakes, and familiarity of problems, as well as the nature of conflict, completeness and reliability in specific domains. It must convey methods of critiquing situation assessments and plans, and of making corrections that will enhance understanding. Practice should be designed to make metacognitive processes explicit. Such practice might involve reciprocal teaching (Palincsar and Brown, 1984), team exercises, explicit labeling of one's own activities, listening to experts label their thought processes, or critiquing the performance of peers. All of these methods help trainees make public otherwise hidden cognitive activities. Making principles explicit may helps trainees transfer what they have learned to varied settings (Collins, Brown, & Newman, 1989). In addition, it may be appropriate to give trainees control over practice parameters that cue metacognitive activities; these include time, immediacy of feedback, quality of feedback, and difficulty. Exercises should employ non-routine cases, as these discourage simple recognitional solution and encourage the

use of metacognitive skills. We have attempted to bear these guidelines in mind while developing training to teach metacognitive skills.

The training methods we have developed focus on two metacognitive skills. Both methods are designed to hone officers' skills in critiquing and correcting assessments and plans. The first method is intended to help officers find and assess the reliability of hidden assumptions before those assumptions cause problems. In essence, the method helps counteract overconfidence. The second method is designed to help officers find and resolve conflicting evidence. This second method deals with assumptions after they cause problems, through inadequate assessments or plans. The second method may be a cure for underconfidence, or confusion. We describe each of the training methods, below.

Finding Hidden Assumptions

The Method

The method of finding hidden assumptions consists of four steps.

1. Select a critical part of your assessment — even if you are confident of it.

2. Imagine that an infallible crystal ball (or some other "perfect" intelligence source) tells you that this part of your assessment is wrong.

3. Explain how this part of your assessment could be wrong.

4. Imagine that the crystal ball now tells you that your explanation is wrong and directs you back to step 3. (Continue until your explanations cover a variety of different mechanisms, which seem representative.)

The product of this exercise is a list of ways an assessment could be wrong. To maintain confidence in the assessment, one must be confident that none of these is the case. It may be possible to dismiss some possibilities as implausible. Others it may be advisable to verify by collecting additional data. Still others can be planned against. The end result may be that one is as confident in the assessment as when you started. But such confidence is now earned by taking seriously the possibility that the assessment is wrong, asking how that could happen, and handling each possibility. Unless each possible exception to the original assessment can be dealt with in some way, the original confidence may not be justified. This simple method reveals hidden assumptions that underlie assessments upon which plans are based.

An Illustration

The following illustration — drawn from an interactive classroom exercise — illustrates the method.

An officer's assessment includes the claim that the enemy will cross the river at location X. He bases this claim on arguments concerning the distance the enemy must travel to his supposed objective via point X, the shallow depth of the river at X, and better concealment opportunities along the bank at X. The officer is confident of this assessment; however stakes are high and there is time to critique the assessment, so he does so. Following the method, above, he imagines that a crystal ball tells him that the enemy will not cross at location X, and demands that he explain this failure in his interpretation of the evidence. He cycles through steps three and four to generate the following list of explanations (or negations of assumptions):

- "The enemy anticipates that our force will be at location X."

- "The enemy will detect the movement of our force to location X."

- "There are good crossing sites that we missed."

- "The enemy doesn't know how good a location X is."

- "The enemy doesn't have any river crossing assets. He can't cross the river at all."

- "The enemy's river crossing assets are so good that he can cross elsewhere."

- "The enemy has a large enough force that he can accept casualties crossing elsewhere."

- "The enemy's objectives are different. He doesn't need to cross at all."

- "The enemy will use air assault to get across the river, rather than cross it."

These nine ideas are exceptions to the officer's recognitional assessment of the situation. Some may be implausible (such as the suggestion that the enemy can afford high casualties in a river crossing). Others may require defensive planning. For example, the enemy could anticipate the current location of own forces, but moving forces surreptitiously would protect against this.

Table 1: Example of exceptions to the interpretation of evidence, and methods of handling the exceptions.

Assessment: The enemy will cross at X.	
Exceptions	Responses
"The enemy anticipates that our force will be at location X."	Place our forces elsewhere then move at the last minute.
"The enemy will detect the movement of our force to location X."	Same as above.
"There are good crossing sites that we missed."	Consult with a specialist in river crossings or scout enemy movements towards other crossing sites.
"The enemy doesn't know how good a location X is."	Dismiss this as implausible given recent intel on enemy surveying and scouting activity.
"The enemy doesn't have any river crossing assets. He can't cross the river at all."	Dismiss this. It presents no problem if true.
"The enemy's river crossing assets are so good that he can cross elsewhere."	Collect intel to verify or disprove.
"The enemy has a large enough force that he can accept casualties crossing elsewhere."	Dismiss this as implausible given current, reliable intel.
"The enemy's objectives are different. He doesn't need to cross at all."	Adopt a contingency plan.
"The enemy will use air assault to get across the river, rather than cross it."	Accept this risk.

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Table 1 includes several responses to the explanations generated above. These responses are of several types: testing the truth of an assumption through recall of evidence or data collection, adopting proactive strategies, adopting contingency plans, and accepting the assumption as a known risk.

We have found this technique of critical thinking to be fast and highly productive. It is particularly effective for officers when they are confident of their assessments. It raises issues that force officers to earn their own confidence by strengthening their assessments and plans to compensate for potential weaknesses.

Training Materials

The text used in training this method is presented in Appendix A on pages A-5 to A-17. The text begins with a motivating statement concerning the method: "Hidden assumptions are a source of weakness in situation assessments, and a source of risk in the courses of action based on them." We then present the method in the form of a flow chart, and apply it to a military scenario. Next, some ways to use the output of the method are briefly described. We then present a final motivating statement, and a practice exercise with sample solutions.

This unit is designed to be used in conjunction with brief lectures and interactive exercises based on pretest materials or the officers' personal experiences. A particularly effective classroom exercise, when trainees have had some operational experience, is to ask for a description of a situation in which someone was very sure of something (e.g., that the enemy would cross the river in a certain location). When the question is put this way, the example usually involves a situation in which the assessment turned out correct. The instructor then "brings out" the crystal ball, which says that this assessment is wrong, and the class is asked to generate ways in which that could happen. The exception conditions are listed and the class is asked to evaluate their seriousness and plausibility, and asked what they would do to handle each possibility.

The next unit of training deals with situations in which assessments turn out to be wrong.

Handling the Unexpected

The Method

Despite careful assessments and planning, officers sometimes find themselves confronting unexpected events. The second training method we have developed is designed to help officers handle events that conflict with a current assessment, rather than simply disregard or discount them. At the same time, an unexpected event does not necessarily imply that the current assessment is wrong. In this training, officers begin by explaining events in terms of the current assessment, but if these explanations are implausible, they alter the assessments themselves. The procedure consists of these steps:

1. Notice unexpected events.

2. Explain how an unexpected event could occur even if your current assessment is correct. (If there have been previous unexpected events, try to find the simplest plausible explanation of all of them.)

3. Evaluate the plausibility of your explanations.

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4. If the explanations are implausible (and if time is available and the stakes are high), take up another assessment and repeat the process from step 1.

The first step is crucial. Noticing unexpected events is more likely if officers have thought about the events implied by their assessments. (Event templates and war-gaming facilitate this.) This training may also increase the likelihood of noticing unexpected events, in two ways: by sensitizing officers to conflicting evidence through presentation of examples, and by teaching them methods for handling it when it occurs.

In some cases, the first step of the method can be the last. That is, it is sometimes enough simply to notice an unexpected event. This is the case if there is no time to analyze the event, if the stakes of the situation are below some threshold, or if one easily recognizes the implications of the event. However, unexpected events should be remembered: Officers may want to revisit them if additional unexpected events occur whose implications are not as clear, or if the stakes of the situation should change.

To execute the second step, explaining the event, the officer can use two tools. The crystal ball (or "perfect" information source) is productive. It instructs the officer to imagine that the assessment is true, and that he must explain the surprising event. Secondly, trainees often find it useful to focus the technique by looking for explanations within each of the categories of METT-T (mission, enemy, troops, terrain and weather, and time available). For example, the trainee may consider how an event might be explained in terms of actions of his own troops, the terrain or weather, enemy tactics, enemy equipment, and so forth.

The product of these methods is a set of ways in which the current assessment could be true, despite the conflicting evidence. In order to hold onto the assessment, then, it is necessary to accept at least one of these conditions as plausible. If each possibility is implausible, or is disconfirmed by actual data collection, then alternative assessments should be considered.

The third step of the method, thus, is an evaluation of the plausibility of the explanations. An important feature of this step is to look at explanations for all the conflicting data that have been observed, not just the most recent item. The total set of explanations of all this conflicting data must be judged plausible if the assessment is to be kept unchanged. The most plausible overall account must consist of individually plausible explanations, but it should also be simple — i.e., not require a large number of independent assumptions. For example, an account of events that relies heavily on enemy deception to explain all of the unexpected events is maximally simple, but not necessarily plausible because deception may be a dubious explanation for several specific events. A plausible account must balance simplicity against the credibility of individual explanations.

The fourth step in the method involves taking up another assessment for consideration. To generate a new assessment, officers can focus on the unexpected evidence by itself as a catalyst for a new assessment. Officers examine the unexpected events they have encountered and answer such questions as, "What do you make of these events?" or "What do these events usually mean?" Thus, we spur the creative process by restricting the evidence from which inferences must be drawn. Once a new assessment is formulated, however, the officer must consider the rest of the evidence, i.e., the evidence that supported the original assessment. These events will conflict with the new assessment. Thus, these events must be explained, using the methods described above, in a manner that is consistent with the new assessment. These explanations must then be evaluated for plausibility and simplicity. The old assessment and the

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new assessment may be compared by asking how convincing a "story" can told in support of each; in other words, how plausible and simple are the assumptions that each entails.

In some cases, a new assessment that is stronger than either of the previous ones can be generated by combining their strengths. In this strategy, the decision maker focuses on the assumptions that the assessments require, dropping the unreliable ones and adopting relatively plausible elements from both "stories."

Illustration

An example is presented here in a table format used during training (see Table 2). The table consists of an assessment concerning the enemy's plan of attack (on the top row), and several events that appear to contradict the assessment in the left-hand column. Across from each conflicting event, in the right-hand column, are explanations that have been generated to explain the conflicting events to make them consistent with the assessment.

Table 2: Table format used to train both finding hidden assumptions and handling the unexpected.

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south.	
Events	Explanations
Southern enemy force has destroyed a major bridge to his front	*[Troops] Perhaps it was our own forces, not the enemy, that destroyed the bridge.
	[Enemy (deception)] Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector.
	[Enemy (mistake)] Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	[Troops] The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities.
	*[Enemy (deception)] The enemy is concealing the location of the attack by instituting radio silence everywhere.
	[Enemy (equipment)] The enemy's C2 equipment has failed.
Reinforcements have arrived in the north.	[Enemy (deception)] The enemy is "showing" arrival in the north before shifting forces stealthily to the south.
	*[Enemy (tactics)] The enemy may be putting green forces on line in the north to execute a secondary attack.
	[Enemy (mistake)] The northern movement of reinforcements may be a mistake.

In this example, the decision maker has used the crystal ball and METT-T categories to generate the interpretations of each event (in the right column). The METT-T category of each explanation is presented in brackets. Explanations marked with an asterisk are those the officer considers the most credible.

The most plausible three explanations for the events in the example concern troops, enemy deception, and enemy tactics. However, it may be improbable to the officer that all three of these explanations are independently true. Thus, for example, he may choose a somewhat simpler account, in which a single cause — our own aggressive interdiction campaign — accounts for the destruction of bridges and radio silence, and a second assumption concerning enemy tactics explains reinforcements in the north. This account balances credibility and simplicity.

Thus far, this illustration employs the first three steps of the method presented above. However, an officer may find that he cannot construct a plausible account of all of the unexpected events. There may be too many events to explain. Suppose that the example were extended to include another unexpected event: the movement of two enemy motorized rifle regiments from the south to the north. Suppose further that every explanation for this event (such as enemy deception or errors) significantly diminishes the plausibility of the account. That is, there is no credible and simple story that supports the assessment that the enemy plans a main attack in the south and a diversionary attack in the north. In this case, a new assessment is in order, per the fourth step of the procedure outlined above.

The officer examines the unexpected events to date and generates a new assessment, in this case that the enemy plans its main attack in the north. He then fills the events column of a table (identical in structure to Table 2) with data that appear to contradict the new assessment. For example, he may recall that the southern terrain is superior for movement and that a southern port is a likely enemy objective. To each unexpected datum, he applies the method of handling unexpected events. That is, he generates multiple interpretations of each datum, and selects from among all explanations the few that tell a plausible story.

Training materials

The text used in training this method is presented in Appendix A on pages A-18 to A-51. It is divided into three sections. The first introduces the method, the second applies it to explaining unexpected events (using the first three steps of the method), and the third concerns revising the situation assessment (beginning with the third and fourth steps, then cycling back to the first).

The introduction begins with a motivating statement, an outline of the four-step method in flow-chart form, and a scenario consisting of a situation description, an assessment, and an update describing an unexpected development, upon which illustrations of the method are based.

The next section, on explaining unexpected events, draws on the scenario to fill out a table containing slots for the situation assessment, unexpected events, and explanations of those events. Instructions and tips are presented in floating captions beside the table, as it is filled in over several pages. This section ends with a statement of the conditions of plausibility under which the assessment should be revised.

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assumptions that support it, and to actively test it by predicting future events. The section ends with a motivating summary of the method, a new, practice scenario with sample solutions, and a pointer to an interactive class exercise.

CONCLUSION

The present report is part of a series of reports. Their purposes are to:

- describe a framework for battlefield situation assessment skill in terms of cognitive theory

- derive implications of the framework for improving battlefield situation assessment performance,

- generate techniques for training battlefield situation assessment, and

- experimentally test the effectiveness of the training techniques.

The training methods described above only illustrate the kinds of training techniques that might be developed for enhancing critical thinking skills. Nevertheless, they appear to have wide potential applicability. The kinds of skills they address seem appropriate in very diverse domains where initial judgments and responses can be verified and improved if time, stakes, and novelty warrant. They may apply in fields ranging from combat to fire fighting to medical decision making. Certainly, they appear to apply across a wide spectrum of Army battlefield environments and force configurations.

Training in effective thinking skills, as illustrated in this report, can be introduced quite early in an officer's training and can be continued and expanded as training progresses. At the basic level, the training could be applied to simpler tactical situations and decisions, while joint tactics as well as operational and strategic decisions would be addressed in more advanced training and exercises. Across all these stages of training, and across a variety of Army battlefield specializations, the thinking processes that are taught would share a consistent set of concepts and procedures. That same framework could serve as an aid in the design and evaluation of exercises and wargames. The groundwork for shared situation understanding and effective coordination would thus be laid as early as possible and would evolve into an explicit common framework as training progressed.

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APPENDIX

The following pages include the training materials described in the text. The material is divided into the following sections:

$C_T{}_I$

Training

Battlefield Situation Assessment

Cognitive Technologies, Inc.

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Army Research Institute

Fort Leavenworth Research Unit
Fort Leavenworth, KA

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One of the most difficult tasks for any commander or staff officer is to accurately assess a complex and uncertain situation.

Cognitive Technologies, Inc., working with the Army Research Institute, interviewed more than 30 experienced Army staff officers to find out how they assess battlefield situations. From the lessons learned in those interviews, we have developed techniques to help other officers refine their situation assessment skills. Officers who are more skilled at assessing situations should, in turn, produce better courses of action and plans.

This training material is based on the expertise of experienced Army commanders and staff.

Introduction

2

Situation Assessment Training

This training focuses on two skills crucial to situation assessment.

Finding hidden assumptions --
Finding weaknesses in your situation assessment BEFORE they cause you problems.

Handling the unexpected -- Refining your situation assessment AFTER unexpected events occur.

Introduction

3

Situation Assessment Training

Finding Hidden Assumptions

Situation Assessment Training

Finding Hidden Assumptions

4

Military decision makers constantly face uncertainty. One way they deal with uncertainty is to make assumptions that "replace necessary but missing or unknown facts," as stated in Ft. Leavenworth training manual ST100-9. Some assumptions are explicit. The staff know what these are and they may try to confirm them. Other assumptions are not stated. Such hidden assumptions are a source of weakness in situation assessments, and a source of risk in the courses of action based on them.

Fortunately, there are methods for finding hidden assumptions....

Situation Assessment Training   Finding Hidden Assumptions   5

Finding Hidden Assumptions

1. Select a critical part of your assessment -- even if you think you are sure of it.

2. Imagine that a "perfect" intelligence source (like a crystal ball) tells you that this part of your assessment is wrong.

3. Explain how it could be wrong.

(Keep going for a while even if you think there's nothing else).

4. The "perfect" intelligence source now tells you that this explanation is wrong! Go back to step 3....

Situation Assessment Training

Finding Hidden Assumptions

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EXAMPLE

Situation Model

Based on distance to travel, depth of the river, and concealment opportunities, the enemy will cross the river at location X.

Plan

Concentrate own forces at location X.
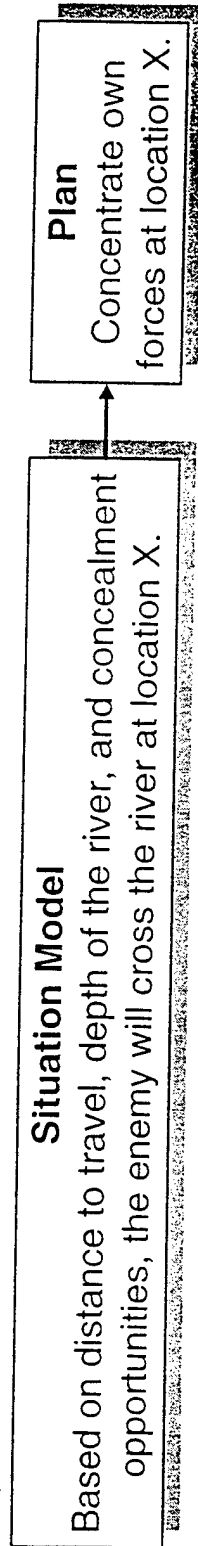
You feel very confident that the enemy will cross at X. However, the stakes are very high, so you decide to search for hidden assumptions.

The "perfect" intelligence source says:

"The enemy will not cross the river at location X. Please explain."

"Explain how it could be that the enemy will not cross at X, despite the distance, depth, and concealment."

You devise Explanation #1: "The enemy anticipates that our force will be at X."

The "perfect" intelligence source says, "This explanation is wrong."

You devise Explanation #2: "The enemy will detect the movement of our force to location X."

The "perfect" intelligence source says, "This explanation is also wrong."

Explanation #3: "There are good crossing sites that we missed."

The source replies, "This explanation is wrong, too."

Explanation #4: "The enemy doesn't know how good location X is."

"Wrong"

Explanation #5: "The enemy doesn"t have any river-crossing assets."

"Wrong..."

Situation Assessment Training   Finding Hidden Assumptions   8

You devise Explanation #6: "The enemy's river-crossing assets are so good they can cross elsewhere."

The "perfect" intelligence source says, "This explanation is wrong."

You devise Explanation #7: "The enemy has a large enough force that they can accept casualities in crossing elsewhere."

The "perfect" intelligence source says, "This explanation is also wrong."

Explanation #8: "The enemy's objectives are different. They don't need to cross at all."

The source replies, "This explanation is wrong, too."

Explanation #9: "The enemy will use air assault to get across the river rather than crossing."

"That's enough for now."

Situation Assessment Training | Finding Hidden Assumptions | 9

Now, Evaluate the possible Exceptions

This method doesn't have to make you less sure of your conclusion. Just because there are possible exceptions to a conclusion doesn't prove it is wrong. But it makes you EARN your confidence. You have forced yourself to consider potential weaknesses -- and corrected them or ruled them out.

You may dismiss the exception as too implausible.

You may decide to accept the risk.

You may collect further information to see if the assumption is true.

You may take action to make the assumption more likely to be true.

You may adjust your plan to accommodate the exception.

Or -- you may change your mind and your plan.

Situation Assessment Training

Finding Hidden Assumptions

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Example: Evaluating the Exceptions

Assessment:
The enemy will cross at X.

Possible exceptions	What We Can Do
Anticipate our force	Use deception - place forces elsewhere, then move
Detect our force	
We missed sites	Place reserves on paths behind river
They missed X	Place reserves on paths behind river
Can't cross	Not a problem
Better assets--cross elsewhere	Collect to make sure
Larger force--accept casualties	Dismiss as too unlikely
Different objective--won't cross	Adopt contingency plan
Air assault--won't cross	Adopt contengency plan

EXERCISE

In preparation for a coming offensive action, you have moved a critical logistics base well forward to support the attack. Your forward base is now located 60 km from the last reported enemy artillery position. Intelligence information states that the suspected type of artillery has a 50 km range. Therefore (an inference) your log base is safely outside enemy artillery range.

You feel very confident that your log base is safe from artillery fire. However, the stakes are very high, so you decide to search for hidden assumptions.

The "perfect" intelligence source says:

"The logistics base is not safe from enemy fire. Please explain."

Situation Assessment Training

Finding Hidden Assumptions

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You devise Explanation #1: "There is undetected artillery within 50 km of the log base."

The "perfect" intelligence source says, "This explanation is wrong."

You devise Explanation #2: "The detected artillery has been localized incorrectly. It is really within 50 km of the log base."

The "perfect" intelligence source says, "This explanation is also wrong."

Explanation #3: "The artillery will be moved rapidly to within 50 km of the log base."

The source replies, "This explanation is wrong, too."

Explanation #4: "Intelligence about the enemy artillery range was wrong. The shells can reach at least 70 km."

"Wrong"

Explanation #5: "The enemy plans to use close air support to augment artillery."

"That's enough for now..."

Situation Assessment Training | Finding Hidden Assumptions | 13

Evaluating the Exceptions

You can try to verify the assumptions.

For example, gather more information concerning enemy artillery range, camouflage methods, or close air support practices.

You can try to shape the battlefield to make sure that the assumptions are true.

Destroy LOCs that might be used to resupply artillery. Target enemy air support assets.

You can develop contingency plans in case an assumption turns out false.

Plan to defend against artillery shelling by using locating radar and counterbattery fires.

or...

You may have good reason to find the new explanations implausible and to stick with your original assumptions.

Keep the log base where it is. Do not plan for the possibility of artillery or air attacks.

You can actually change your assumptions if you find one of the new explanations plausible.

Ensure air defense weapons are employed to protect the log base.

You can change your course of action so that your plans no longer depend on the assumptions -- or are less vulnerable to the assumptions.

For example, move the log base to the rear. Or use passive defensive measures against the possibility of artillery or air attack.

Situation Assessment Training

Finding Hidden Assumptions

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In sum, this method helps you to critique assessments. No matter how confident you may feel about a key part of your assessment, it forces you to consider potential weaknesses. By explaining how a key part of your assessment might be false, you can find hidden assumptions. Handle these as you would handle any assumptions: Evaluate their plausibility, try to verify them, plan against them, or capitalize on them to refine your assessment and your course of action.

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Finding Hidden Assumptions

Situation Assessment Training

Exercise

You are a division commander with a mission to defend toward the west against avenues of approach to an enemy objective in the east. You assess the force ratio to be six to one in favor of the enemy, and with current forces it is unlikely that the defense will be successful. To better your odds, you attempt to shape the battlefield. You look for canalizing terrain in which to mass fires on the enemy. You find such terrain to your north, at a mountain pass running east to west between two open areas of rolling hills with good, defensible terrain. You plan to position a brigade(-) to the east of the pass, believing that the enemy will attempt to strike it, in accordance with Soviet doctrine to attack weakness. The balance of your forces are positioned to move north quickly and undetected to hit the enemy on his southern flank as he emerges from the pass. The enemy is capable of attacking in either the south or at the northern pass. However, if he moves north, he must commit early and conspicuously as he enters the pass. This is a clear decision point at which you will move your troops.

See sketch...

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Situation Assessment Training   Finding Hidden Assumptions

Own brigade (-)

KILL ZONE

We maneuver heavy forces north

Enemy commits to crossing the pass

Enemy progresses to trigger point

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Finding Hidden Assumptions

Situation Assessment Training

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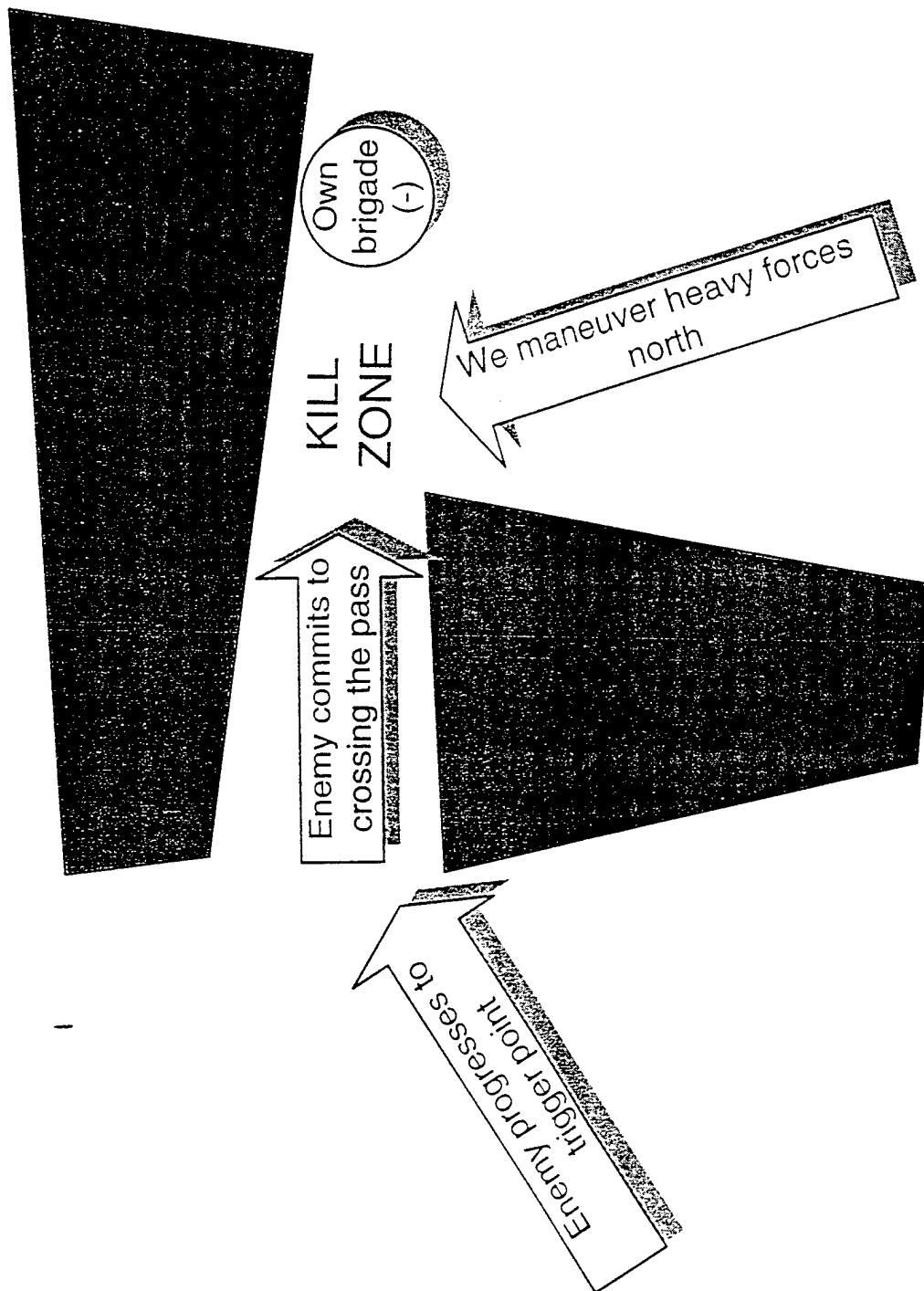
Apply the technique

Your assessment hinges on the enemy's intent to attack at the pass. The "crystal ball" reveals that the enemy will not attack through the pass. How could this happen?

Use a sheet of paper from the pad to write some explanations.

Here are two explanations that this technique can uncover.

Explanation #1: The enemy may never learn that you are weak in the north because all his recce is destroyed by your covering force.

Therefore, your force must allow some enemy recce to survive.

Explanation #2: The enemy might detect movement of your main forces to the north, suspect a flanking movement, and attack your new weakness in the south.

Perhaps you can take additional precautions to hide your troop movements.

Situation Assessment Training

Finding Hidden Assumptions

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Try the technique again on several issues from the Island scenario that you read earlier.

Use packet B.

Situation Assessment Training | Finding Hidden Assumptions

Handling the Unexpected

Situation Assessment Training

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Handling the Unexpected

A good situation assessment allows you to explain past events, predict future events, and devise a sound course of action. But situation assessments are seldom perfect, and unexpected events may occur. There are two common responses to unexpected events: (1) Ignore or discount them. (2) Immediately lose confidence and change your assessment. Both responses can be dangerous. An unexpected event must be taken seriously. But it doesn't necessarily mean your assessment is wrong. It could be a problem with your understanding of the unexpected event.

This section presents a method for handling the unexpected.

Situation Assessment Training | Handling the Unexpected

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There are two types of responses you can make to unexpected events and information, such as reports of past enemy activity, or current intelligence on enemy disposition:

CHANGE YOUR ASSESSMENT OF THE SITUATION: You can create a new assessment of the situation that better accounts for the new information.

The method we present helps you understand when it is necessary to change your mind.

EXPLAIN IT: You can devise an explanation of how the new information fits with your current assessment, without changing that assessment.

The method we present here shows you how to use the "crystal ball" and METT-T to create better explanations for unexpected events.

Handling the Unexpected

Situation Assessment Training

Handling the Unexpected

1. **NOTICE** unexpected events!

2. Try to **EXPLAIN** unexpected events in terms of your current situation picture.

3. **EVALUATE** the explanations.

4. If explanations are not plausible, **CHANGE** your situation picture.

We will show you....

1. Procedures for handling unexpected events by explaining them in terms of your current assessment or by using them to change your current assessment.

2. A table that may help you remember and/or use the method.

3. An illustration of the method. The illustration is based on the scenario that we present on the next page.

Situation Assessment Training   Handling the Unexpected   26

Scenario

The situation: You are a contingency force division commander who is defending the port through which reinforcements are arriving. Enemy forces are arrayed about 100 km away to your northeast and to your southeast. From either location, the enemy must traverse several rivers to reach their objective. The northern enemy force is better equipped for these river crossings than the southern force, and its commander is more experienced than his southern counterpart. The southern terrain and roadways support rapid armor movement there difficult. However, poor roads and rough terrain in the north make armor enemy force has a more direct path to the port. The port is in the southern part of your sector, and it poses an attractive target to the enemy. Furthermore, the enemy has had marked success attacking your southern sector (but not the northern sector). Soviet doctrine, on which the enemy relies, is to exploit success.

The assessment: The enemy plans to execute its main attack in the south to seize the port and prevent your reinforcement. They will launch a secondary, diversionary attack in the north.

Update: You receive an intelligence report that the southern enemy forces have destroyed a major bridge to their front, thus limiting their own ability to conduct a major attack there.

What technique can help handle unexpected events such as this?

| Situation Assessment Training | Handling the Unexpected | 27 |

Handling the Unexpected: Explaining Unexpected Events

Situation Assessment Training

Handling the Unexpected

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Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	

1. NOTICE each unexpected event related to a key assessment.

If there is no time, or other priorites are more important, stop here. BUT ALWAYS AT LEAST NOTICE UNEXPECTED EVENTS!

If the cost of a mistake is high, or if a *significant number of* unexpected events occurs, you should take the time to think about them further.

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Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	"Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy."

2. Try to EXPLAIN the unexpected information to make it consistent with the current assessment.

Imagine that a "perfect" information source claims, "Your current assessment IS true, despite the unexpected event. Explain this."

You can try to think of explanations within each METT-T category.

Situation Assessment Training   Handling the Unexpected

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	•Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.

3. EVALUATE these explanations.

If you wish to hold on to the original assessment, you must find AT LEAST ONE of these explanations reasonably plausible. It has now become an *assumption*. You can try to verify it, shape the battlefield to make it true, adopt contingency plans in case it is false, and so on.

If no explanation is satisfactory, change your assessment.

Follow this same procedure for any other unexpected events that follow.

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	•Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	Troops: The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities. •Enemy (deception): The enemy is concealing the location of the attack by instituting radio silence everywhere. Enemy (equipment): The enemy's C2 equipment has failed.

1. NOTICE the unexpected event.

2. EXPLAIN it within the scope of your current assessment (Use the "crystal ball")

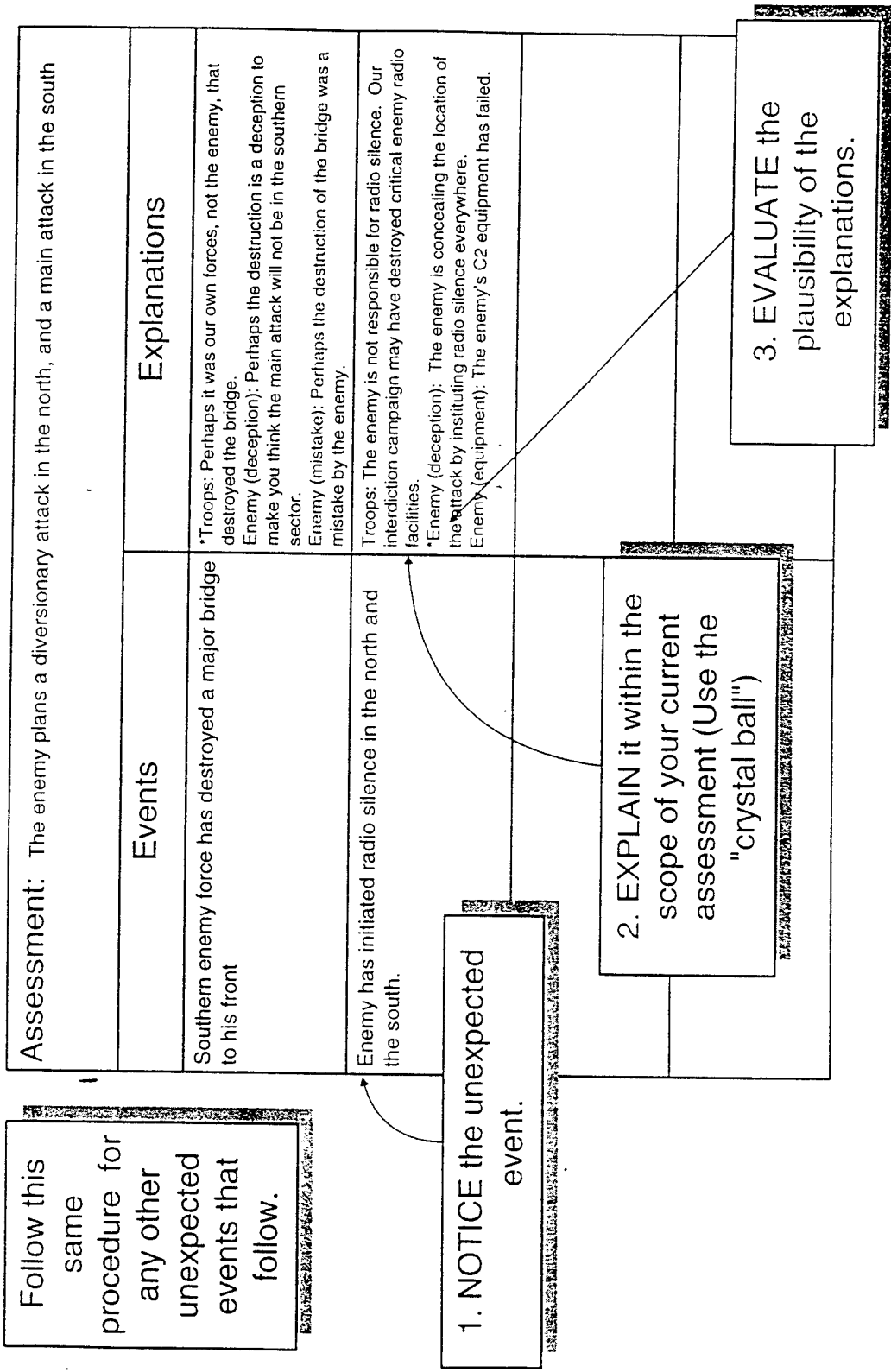3. EVALUATE the plausibility of the explanations.

Situation Assessment Training   Handling the Unexpected

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	*Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	Troops: The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities. *Enemy (deception): The enemy is concealing the location of the attack by instituting radio silence everywhere. Enemy (equipment): The enemy's C2 equipment has failed.

Look at the explanations you generated for earlier events. Try to come up with some explanations that account for more than one event.

For example, these two events might both be explained as consequences of our own actions. They may also both be explained in terms of an enemy deception plan.

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	•Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	Troops: The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities. •Enemy (deception): The enemy is concealing the location of the attack by instituting radio silence everywhere. Enemy (equipment): The enemy's C2 equipment has failed.
Reinforcements have arrived in the north.	Enemy (deception): The enemy is "showing" arrival in the north before shifting forces stealthily to the south. •Enemy (tactics): The enemy may be putting green forces on line in the north to execute a secondary attack. Enemy (mistake): The northern movement of reinforcements may be a mistake.

Give some extra weight to explanations that apply to more than one event.

For example: Our own forces destroyed the bridge; radio silence is due to deception; and reinforcements in the north are due to the secondary attack. This account is less convincing because it requires three different assumptions, even though each by itself is plausible.

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Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front.	•Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	Troops: The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities. •Enemy (deception): The enemy is concealing the location of the attack by instituting radio silence everywhere. Enemy (equipment): The enemy's C2 equipment has failed.
Reinforcements have arrived in the north.	Enemy (deception): The enemy is "showing" arrival in the north before shifting forces stealthily to the south. •Enemy (tactics): The enemy may be putting green forces on line in the north to execute a secondary attack. Enemy (mistake): The northern movement of reinforcements may be a mistake.

The simplest account explains all three events the same way (for example, deception).

The best overall account need not be the simplest. It must BALANCE simplicity and plausibility.

For example, you may find that the most convincing overall account is that our forces destroyed the bridge and caused the radio silence, but that reinforcements in the north are in support of the secondary attack.

Assessment: The enemy plans a diversionary attack in the north, and a main attack in the south

Events	Explanations
Southern enemy force has destroyed a major bridge to his front	•Troops: Perhaps it was our own forces, not the enemy, that destroyed the bridge. Enemy (deception): Perhaps the destruction is a deception to make you think the main attack will not be in the southern sector. Enemy (mistake): Perhaps the destruction of the bridge was a mistake by the enemy.
Enemy has initiated radio silence in the north and the south.	Troops: The enemy is not responsible for radio silence. Our interdiction campaign may have destroyed critical enemy radio facilities. •Enemy (deception): The enemy is concealing the location of the attack by instituting radio silence everywhere. Enemy (equipment): The enemy's C2 equipment has failed.
Reinforcements have arrived in the north.	Enemy (deception): The enemy is "showing" arrival in the north before shifting forces stealthily to the south. •Enemy (tactics): The enemy may be putting green forces on line in the north to execute a secondary attack. Enemy (mistake): The northern movement of reinforcements may be a mistake.
Two enemy motorized rifle regiments (MRRs) are moving from the south to the north.	Enemy (deception): The enemy is "showing" arrival in the north before shifting forces stealthily to the south. Enemy (mistake): The northern movement of the motorized regiments may be a mistake.

Explaining all four surprises requires too many new unverified assumptions.
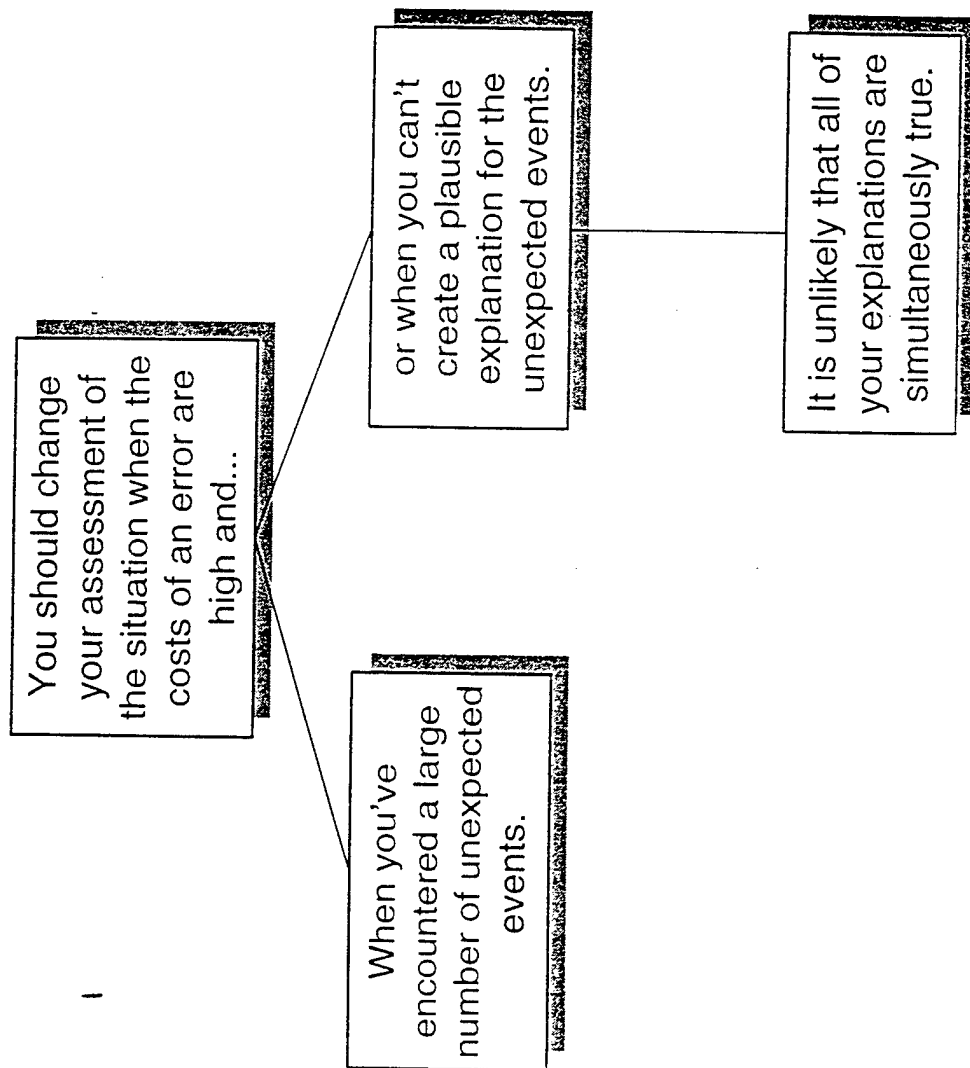
4. You may eventually encounter an event that is just one too many to explain. There is no reasonably simple and plausible account of all the events within the scope of your current assessment. This is a signal to consider changing your assessment of the situation.

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You should change your assessment of the situation when the costs of an error are high and...

When you've encountered a large number of unexpected events.

or when you can't create a plausible explanation for the unexpected events.

It is unlikely that all of your explanations are simultaneously true.

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Handling the Unexpected: Changing Your Assessment

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Don't forget your original reasons!

Changing your assessment of the situation means that you must create a NEW account of all the information.

You presumably had reasons for your original assessment.
If so, they are now "unexpected events" from the point of view of your NEW assessment.

Try to explain them in terms of your NEW assessment.

Assessment: The enemy plans to launch his main attack in the north.

Events	Explanations
Doctrine dictates enemy reinforce southern success.	
Port in south is likely objective	
Southern terrain is superior for movement.	

Your new assessment of the situation.

1. REMEMBER the information and events that supported your original assessment. These are now *unexpected* from the point of view of your new assessment.

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2. EXPLAIN the unexpected information and events to make them consistent with your new assessment.

Assessment: The enemy plans to launch his main attack in the north.

Events	Explanations
Doctrine dictates enemy reinforce southern success.	Enemy (capabilities): Enemy is not capable of complying with doctrine because of destruction of bridge. *Enemy (deception): Enemy is intentionally deviating from doctrine because he believes we will defend more heavily in the south and intends to make main effort where we least expect it.
Port in south is likely objective	*Enemy (deception): Enemy will accept longer, less obvious route to port as deception measure. Enemy (tactics): Enemy believes that seizure of northern sector will stop port operations even if port is not captured.
Southern terrain is superior for movement.	*Enemy (deception): Enemy knows we recognize that the southern terrain is favorable and therefore believes we will make main defense in south. Terrain in north is adequate.

Imagine that the perfect intelligence source says "Your new assessment is correct despite your original reasons to the contrary. How can this be?"

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Assessment: The enemy plans to launch his main attack in the north.

Events	Explanations
Doctrine dictates enemy reinforce southern success.	Enemy (capabilities): Enemy is not capable of complying with doctrine because of destruction of bridge. *Enemy (deception): Enemy is intentionally deviating from doctrine because he believes we will defend more heavily in the south and intends to make main effort where we least expect it.
Port in south is likely objective	*Enemy (deception): Enemy will accept longer, less obvious route to port as deception measure. Enemy (tactics): Enemy believes that seizure of northern sector will stop port operations even if port is not captured.
Southern terrain is superior for movement	*Enemy (deception): Enemy knows we recognize that the southern terrain is favorable and therefore believes we will make main defense in south. Terrain in north is adequate.

3. EVALUATE the explanations. Try to determine the most convincing overall account.

Deception is a plausible explanation of each piece of information, and provides a single, simple account.

Handle the new situation assessment the same way you do any assessment.

(Note that these steps may generate more unexpected events and information. That's what makes situation assessment a continuous and iterative process.)

Search for hidden assumptions. Use the "crystal ball".

Collect information that supports or contradicts the new assessment.

Use the assessment to predict future events and test the accuracy of those predictions.

Use the new assessment to revise your COA.

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In sum, the method you've just studied is designed to help you handle unexpected events and information proficiently.

It provides a technique for explaining events in ways that preserve your current assessment

It specifies guidelines for when to stop "explaining away" unexpected events -- that is, when to change your assessment.

And it presents guidelines for changing your assessment to adapt to new information and new conditions on the battlefield.

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Exercise

The enemy is a guerrilla force whose apparent goals involve embarrassing friendly forces or disrupting communication, transportation, and other activities. These objectives can only be acccomplished in the north. The enemy is currently in the south. A region of steep hills and deep valleys lies between the enemy forces and the objective area. Slopes are steep, so trails run only along the valley crevices and exposed ridgelines.

You conclude that the enemy will travel north to conduct guerrilla activities. You expect that the enemy will travel off trails to avoid ambush. He will avoid moving along the ridge line to prevent exposure by "skylining." Your assessment, therefore, is that he will travel along steep, forested hillside contours. You develop a COA based on this assessment.

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Update: The next morning's report indicates that the enemy has traveled overnight. He has traveled north 50% further than you expected.

How could you explain this information within the scope of your current assessment? Use the blank table numbered as page 45.

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Assessment:

Events	Explanations

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Assessment: Guerrillas will avoid trails in valleys and on ridge lines.

Events	Explanations
Guerrillas have traveled north 50% further than you expected.	The guerrillas are traveling more lightly than expected. The guerillas are more experienced jungle fighters than expected. The hillside terrain provides more level footing than expected. The hillside terrain is less dense or muddy than expected.

Some possible explanations of this information are...

If any of these explanations checks out, your original assessment couldstill be true. But do they check out?

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Assessment:

Events	Explanations
Guerrillas have traveled north 50% further than you expected.	The guerrillas are traveling more lightly than expected. The guerrillias are more experienced jungle fighters than expected. The hillside terrain provides more level footing than expected. The hillside terrain is less dense or muddy than expected.

You now receive a new terrain analysis from the G-2.

The vegetation in the hilly, central region is much taller and thicker than expected.

This information shoots down some of the explanations you gave earlier. It is now too difficult to explain the guerrillas speed in terms of your original assessment. Navigation off the trails will be too slow.

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Assessment: _____

Events	Explanations

What is your new assessment? How can you explain prior information in terms of your new assessment? Use the blank table.

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A new assessment and some ways of explaining prior information are...

Assessment: The enemy will use valley trails and ridge lines rather than hillside contours.	
Events	Explanations
The enemy will avoid ridges in order to prevent "skylining."	The ridges are overgrown with high vegetation, so the enemy can travel these without "skylining."
The enemy will avoid valley paths to reduce the risk of ambush.	The valley paths are probably somewhat overgrown, so they are harder for us to find and set up ambushes.

Try the technique again on several issues from the Island scenario that you read earlier.

Use packet C and the blank tables on the pages numbered as pages 53 to 55.

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Assessment:

Events	Explanations

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Assessment:

Events	Explanations
1	

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Assessment:

Events	Explanations

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